1 FEATURES

- WIDE OPERATING VOLTAGE RANGE (1.8 to 6 V)
- BUILT-IN LOW-VOLTAGE REFERENCE (0.2V)
- LINEARITY IN SPEED ADJUSTMENT
- HIGH STABILITY VS. TEMPERATURE
- LOW NUMBER OF EXTERNAL Parts

2 DESCRIPTION

The TDA7274 is a monolithic integrated circuit DC motor speed controller intended for use in micro-cassettes, radio cassette players and other consumer equipment. It is particularly suitable for low-voltage applications.

Figure 1. Package

Table 1. Order Codes

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDA7274D</td>
<td>SO8</td>
</tr>
</tbody>
</table>

Figure 2. Application Circuit

- $V_S = 3.0V$
- $R_W = 4.9k$
- $R_1 = 22k$
- $E_Q = 1.85V$
- $I_{M} = 100mA$
- $V_S = R_W I_M + E_Q = 2.14V$
Figure 3.

Table 2. Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_S$</td>
<td>Supply Voltage</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>$I_M$</td>
<td>Motor Current</td>
<td>700</td>
<td>mA</td>
</tr>
<tr>
<td>$P_{tot}$</td>
<td>Power Dissipation at Tamb = 25°C</td>
<td>1.25</td>
<td>W</td>
</tr>
</tbody>
</table>

Table 3. Thermal Data

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{th,j-amb}$</td>
<td>Thermal Resistance Junction-ambient</td>
<td>100</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

Figure 4. Schematic Diagram
Table 4. Electrical Characteristics (Refer to test circuit, $V_S = 3V$, $T_{amb} = 25°C$ unless otherwise specified)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_S$</td>
<td>Supply Voltage Range</td>
<td></td>
<td>1.8</td>
<td>6</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$V_{ref}$</td>
<td>Reference Voltage</td>
<td>$I_M = 100mA$</td>
<td>0.18</td>
<td>0.20</td>
<td>0.22</td>
<td>V</td>
</tr>
<tr>
<td>$I_q$</td>
<td>Quiescent Current</td>
<td></td>
<td>2.4</td>
<td>6.0</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$I_d$ (Pin 6)</td>
<td>Quiescent Current</td>
<td>$I_M = 100mA$</td>
<td>120</td>
<td></td>
<td></td>
<td>µA</td>
</tr>
<tr>
<td>$K$</td>
<td>Shunt Ratio</td>
<td>$I_M = 100mA$</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>–</td>
</tr>
<tr>
<td>$V_{sat}$</td>
<td>Residual Voltage</td>
<td>$I_M = 100mA$</td>
<td>0.13</td>
<td>0.3</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$\Delta V_{ref}/\Delta V_S$</td>
<td>Line Regulation</td>
<td>$I_M = 100mA; ; V_S = 1.8 \text{ to } 6V$</td>
<td>0.20</td>
<td>%/V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta K/\Delta V_S$</td>
<td>Voltage Characteristic of Shut Ratio</td>
<td>$I_M = 100mA; ; V_S = 1.8 \text{ to } 6V$</td>
<td>0.80</td>
<td>%/V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta V_{ref}/\Delta I_M$</td>
<td>Load Regulation</td>
<td>$I_M = 20 \text{ to } 200mA$</td>
<td>0.004</td>
<td>%/mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta K/\Delta I_M$</td>
<td>Current Characteristic of Shut Ratio</td>
<td>$I_M = 20 \text{ to } 200mA$</td>
<td>–0.03</td>
<td>%/mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta V_{ref}/\Delta T_{amb}$</td>
<td>Temperature Characteristic of Reference Voltage</td>
<td>$I_M = 100mA$</td>
<td>0.04</td>
<td>%/C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta K/\Delta T_{amb}$</td>
<td>Temperature Characteristic of Shut Ratio</td>
<td>$I_M = 100mA; ; T_{amb} = 20 \text{ to } 60°C$</td>
<td>0.02</td>
<td>%/C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5. Test Circuit

[Image of Test Circuit]
Figure 6. Quiescent Current vs. Supply Voltage.

Figure 7. Reference Voltage vs. Supply Voltage.

Figure 8. Shunt Ratio vs. Supply Voltage.

Figure 9. Reference Voltage vs. Load Current.

Figure 10. Shunt Ratio vs. Load Current.

Figure 11. Minimum Supply Voltage (typical) vs. Load Current.
Figure 12. Saturation Voltage vs. Load Current.

Figure 13. Quiescent Current vs. Ambient Temperature.

Figure 14. Reference Voltage vs. Ambient Temperature.

Figure 15. Application Circuit

$$V_B = 3.0V$$
$$R_O = 4.9k$$
$$I_B = 100mA$$
$$R_T = 2200$$
$$V_{IN} = R_O I_B + E_B = 2.14V$$

Figure 16. P. C. Board and Components layout of the Circuit of fig. 15.

Figure 17. Speed Variations vs. Supply Voltage.
3  APPLICATION INFORMATION

Figure 20.

\[ E_g = R_T I_d + I_M \frac{R_T}{R_M} + V_{ref} \left[ 1 + \frac{R_S}{R_T} \right] \]

\[ R_S \text{ has to be adjusted so that the applied voltage } V_M \text{ is suitable for a given motor, the speed is then linearly adjustable varying } R_B. \]

The value of \( R_T \) is calculated so that \( R_T (\text{max.}) < K (\text{min.}) \cdot R_M (\text{min}) \). If \( R_T (\text{max.}) > K \cdot R_M \), instability may occur.

The values of \( C_1 \) (4.7 µF typ.) and \( C_2 \) (1 mF typ.) depend on the type of motor used. \( C_1 \) adjusts WOW and flutter of the system. \( C_2 \) suppresses motor spikes.
Figure 21. 3V Stereo Cassette Miniplayer with Motor Speed Control.
Figure 22. SO8 Mechanical Data & Package Dimensions

<table>
<thead>
<tr>
<th>DIM.</th>
<th>mm</th>
<th>inch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MIN.</td>
<td>TYP.</td>
</tr>
<tr>
<td>A</td>
<td>1.35</td>
<td>1.75</td>
</tr>
<tr>
<td>A1</td>
<td>0.10</td>
<td>0.25</td>
</tr>
<tr>
<td>A2</td>
<td>1.10</td>
<td>1.65</td>
</tr>
<tr>
<td>B</td>
<td>0.33</td>
<td>0.51</td>
</tr>
<tr>
<td>C</td>
<td>0.19</td>
<td>0.25</td>
</tr>
<tr>
<td>d</td>
<td>4.80</td>
<td>5.00</td>
</tr>
<tr>
<td>E</td>
<td>3.80</td>
<td>4.00</td>
</tr>
<tr>
<td>e</td>
<td>1.27</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>5.80</td>
<td>6.20</td>
</tr>
<tr>
<td>h</td>
<td>0.25</td>
<td>0.50</td>
</tr>
<tr>
<td>L</td>
<td>0.40</td>
<td>1.27</td>
</tr>
<tr>
<td>k</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ddd</td>
<td>0.10</td>
<td></td>
</tr>
</tbody>
</table>

Note: (1) Dimensions D does not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.15mm (.006 inch) in total (both side).
### Table 5. Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Description of Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2003</td>
<td>3</td>
<td>First Issue EDOCS</td>
</tr>
<tr>
<td>September 2004</td>
<td>4</td>
<td>Stylesheet update</td>
</tr>
</tbody>
</table>